Pomperaug River

Watershed Summary

WATERSHED DESCRIPTION AND MAPS

The Pomperaug River watershed covers an area of approximately 13,691 acres in western Connecticut (Figure 1). There are multiple municipalities located at least partially in the watershed, including Woodbury and Southbury, CT.

The Pomperaug River watershed includes two segments impaired for recreation due to elevated bacteria levels. These segments were assessed by Connecticut Department of Energy and Environmental Protection (CT DEEP) and included in the CT 2010 303(d) list of impaired waterbodies. Some segments in the watershed are currently unassessed as of the writing of this document. This does not suggest that there are no issues on these segments, but indicates a lack of current data to evaluate the segments as part of the assessment process. An excerpt of the Integrated Water Quality Report is included in Table 1 (CTDEEP, 2010).

The lower Pomperaug River impaired segment (CT6800-00_01) (Segment 1) begins at the confluence with Transylvania Brook, south side of East Flat Hill Road, in Southbury. It flows through a largely wooded area to its confluence with the Housatonic River (downstream of River Road crossing, near west side of I84, Exit 13). The upper Pomperaug River impaired segment (CT6800-00_03) (Segment 3) is the further upstream of the two impaired segments. It begins at the confluence with Bullet Hill Brook and flows through a suburban area surrounded by a narrow tree-lined corridor flanked by ball fields and a golf course, until the Flood Hill Bridge Road crossing.

Both segments included in this document have a water quality Class of B. Designated uses for both segments include habitat for fish and other aquatic life and wildlife, recreation, and industrial and agricultural water supply. These segments of the river are impaired due to elevated bacteria concentrations, affecting recreation. As there are no designated beaches in these segments of the Pomperaug River,

Impaired Segment Facts

Impaired Segments:
1. Pomperaug River (CT6800-00_03)
2. Pomperaug River (CT6800-00_01)

Towns: Southbury

Impaired Segments and Lengths (miles):
CT6800-00_01 (2.74)
CT6800-00_03 (1.97)

Water Quality Classifications:
CT6800-00_01 (Class B)
CT6800-00_03 (Class B)

Designated Use Impairments:
Recreation

Sub-regional Basin Name and Code: Pomperaug River, 6800

Regional Basin: Pomperaug

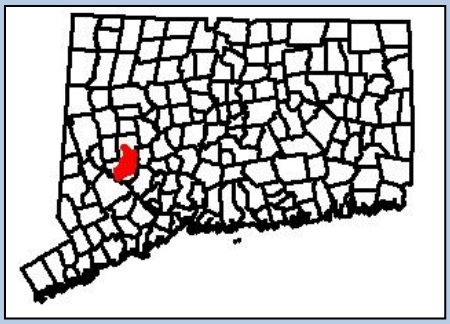
Major Basin: Housatonic

Watershed Area (acres): 13,691

MS4 Applicable? Yes

Applicable Season: Recreation Season (May 1 to September 30)

Figure 1: Watershed location in Connecticut



the specific recreation impairment is for non-designated swimming and other water contact related activities.

Table 1: Impaired segments and nearby waterbodies from the Connecticut 2010 Integrated Water Quality Report

Waterbody ID	Waterbody Name	Location	Miles	Aquatic Life	Recreation	Fish Consumption
CT6800-00_01	Pomperaug River-01	From mouth at confluence with Housatonic River (DS of River Road crossing, near west side of I84, exit 13), US to confluence withTransylvania Brook (south side of East Flat Hill Road), Southbury.	2.74	FULL	U*	FULL
CT6800-00_02	Pomperaug River-02	From confluence withTransylvania Brook (south side of East Flat Hill Road), US to Flood Bridge Road crossing, Southbury.	1.97	FULL	U	FULL
CT6800-00_03	Pomperaug River-03	From Flood Bridge Road crossing, US to confluence with Bullet Hill Brook (just DS of Heritage Road crossing), Southbury. (Segment includes Heritage Village POTW discharge)	1.31	U	NOT	FULL
CT6800-00_04	Pomperaug River-04	From confluence with Bullet Hill Brook (just DS of Heritage Road crossing), Southbury, US to headwaters at confluence of Nonewaug River and Weekeepeemee River (just DS of Washington Road (Route 47) crossing), Woodbury.	7.38	FULL	U	FULL

Shaded cells indicate impaired segment addressed in this TMDL

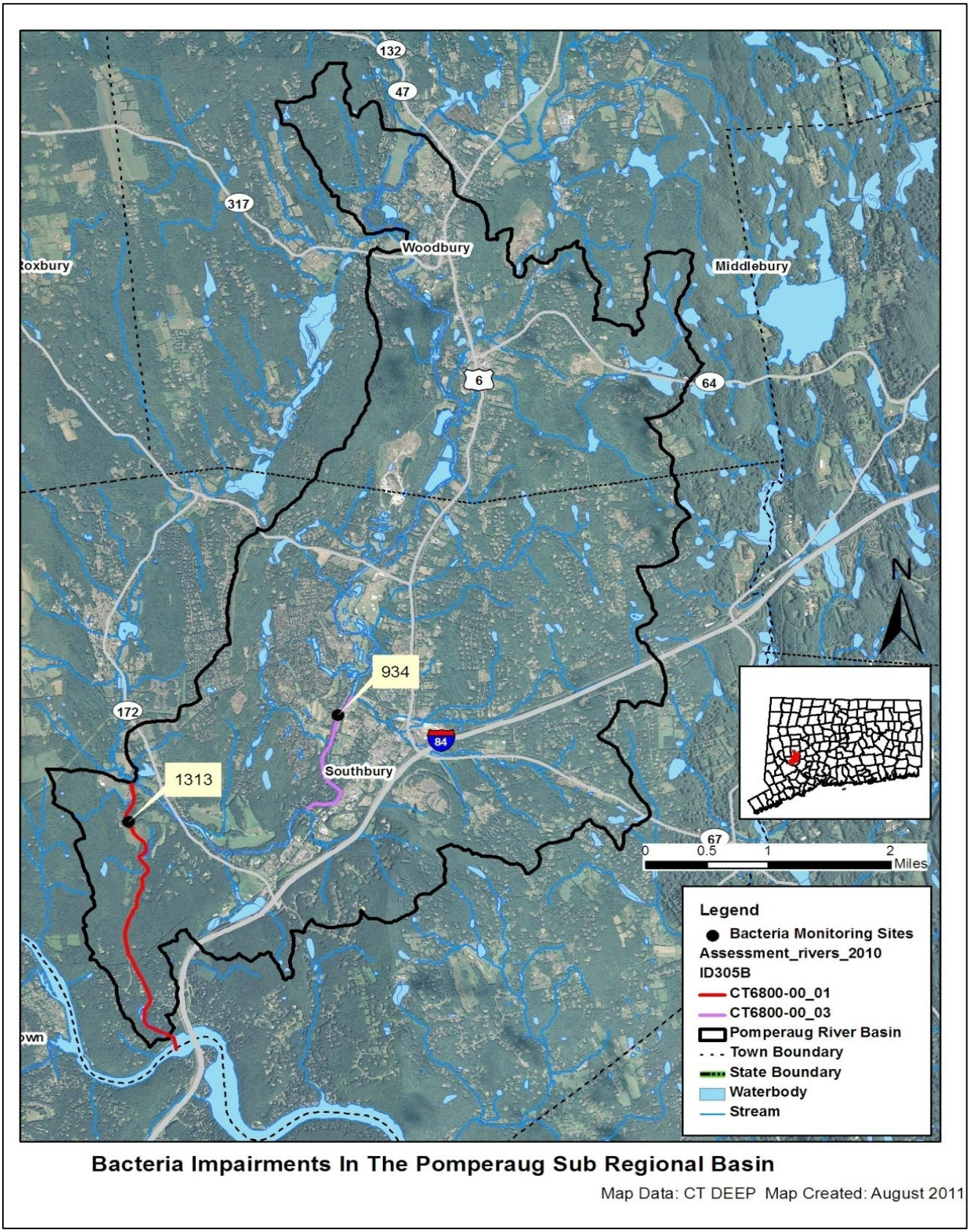
***Impairment determined from 2010 data; will be listed as impaired on the 2012 303(d) List of Impaired Waters**

FULL = Designated Use Fully Supported

NOT = Designated Use Not Supported

U = Unassessed

Figure 2: GIS map featuring general information of the Pomperaug River watershed at the sub-regional level



Land Use

Existing land use can affect the water quality of waterbodies within a watershed (USEPA, 2011c). Natural processes, such as soil infiltration of stormwater and plant uptake of water and nutrients, can occur in undeveloped portions of the watershed. As impervious surfaces (such as rooftops, roads, and sidewalks) increase within the watershed landscape from commercial, residential, and industrial development, the amount of stormwater runoff to waterbodies also increases. These waterbodies are negatively affected as increased pollutants from nutrients and bacteria from failing and insufficient septic systems, oil and grease from automobiles, and sediment from construction activities become entrained in this runoff. Agricultural land use activities, such as fertilizer application and manure from livestock, can also increase pollutants in nearby waterbodies (USEPA, 2011c).

As shown in Figures 2 and 4, the Pomperaug River watershed consists of 61% forest, 31% urban area, 5% agriculture, and 3% water. The northern portions of the watershed in Woodbury are characterized by a mix of wooded and suburban land use, with the river generally following the developed Route 6 corridor. There are several ponds and a gravel extraction operation in the center of the watershed, as well as several golf courses and ball fields adjacent to the river in Southbury. The impaired segments are both well south of the Woodbury–Southbury municipal border. The Pomperaug River (Segment 1) flows through the lowermost part of the watershed, in an area that is predominantly wooded. Though agricultural land uses only occupy 5% of the watershed, multiple agricultural operations can be found along the primary river corridor (Figure 4) both upstream and downstream of the impaired segments.

Figure 3: Land use within the Pomperaug River watershed

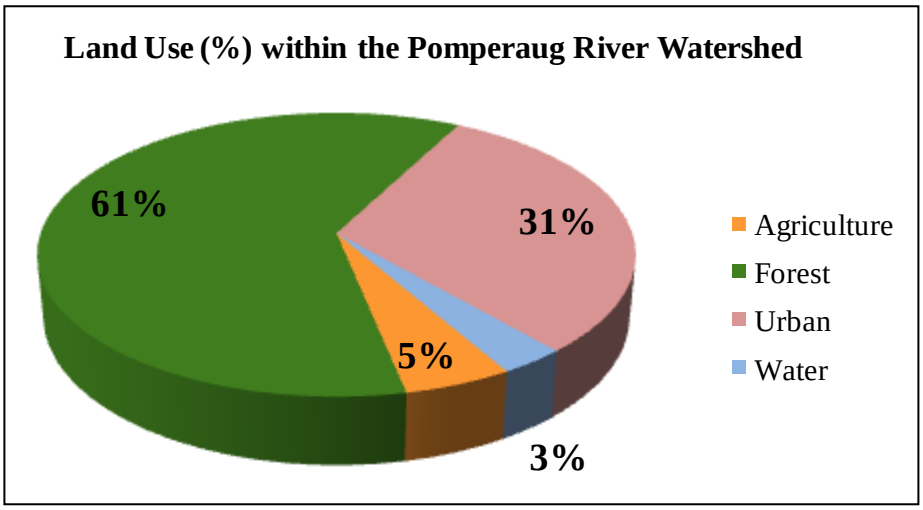
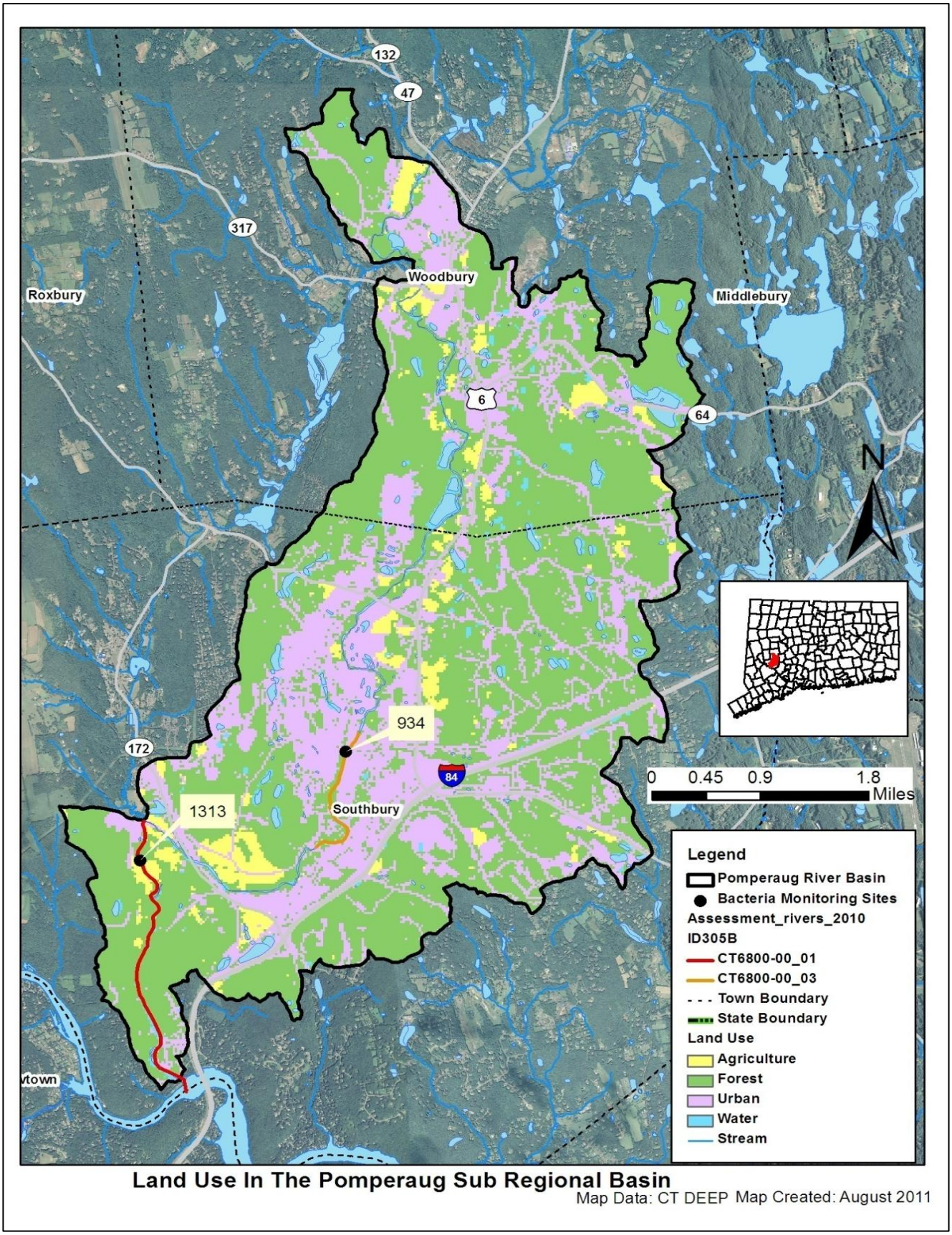


Figure 4: GIS map featuring land use for the Pomperaug River watershed at the sub-regional level



WHY IS A TMDL NEEDED?

E. coli is the indicator bacteria used for comparison with the CT State criteria in the CT Water Quality Standards (WQS) (CTDEEP, 2011). All data results are from CT DEEP, USGS, Bureau of Aquaculture, or volunteer monitoring efforts at stations located on the impaired segments.

Table 2: Sampling station location description for impaired segments in the Pomperaug River watershed

Waterbody ID	Waterbody Name	Station	Station Description	Municipality	Latitude	Longitude
CT6800-00_01	Pomperaug River	1313	Off Flagg Swamp Road	Southbury	41.467231	-73.258047
CT6800-00_03	Pomperaug River	934	Poverty Road	Southbury	41.481167	-73.225208

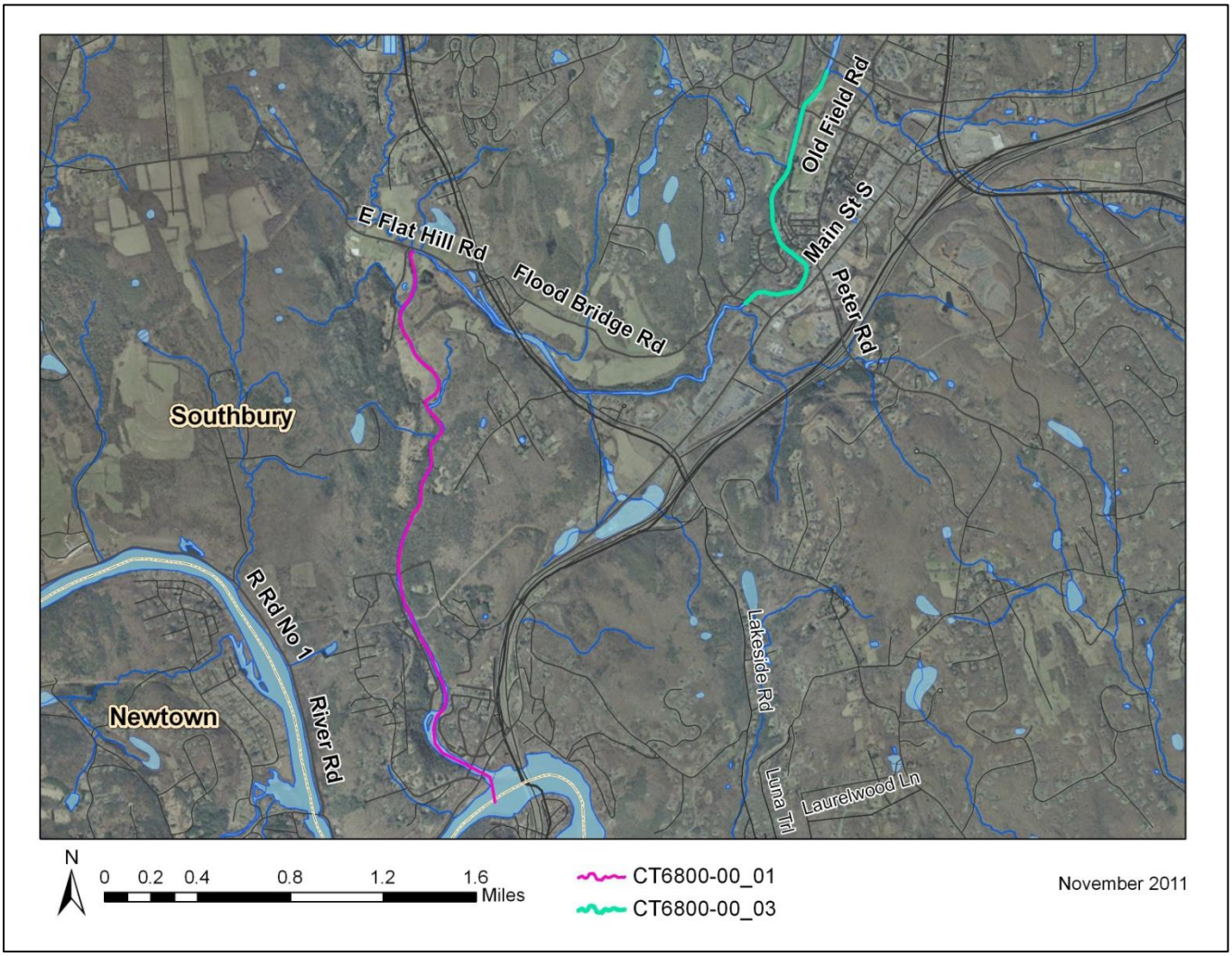
The lower Pomperaug River (CT6800-00_01) is a Class B freshwater river (Figure 5). Its applicable designated uses are habitat for fish and other aquatic life and wildlife, recreation, and industrial and agricultural water supply. Water quality analyses were conducted using data from Station 1313 in 2010 for the lower Pomperaug River (Table 2). The water quality criteria for *E. coli*, along with bacteria sampling results from 2010, are presented in Table 11. Single sample values for Station 1313 exceeded the WQS for *E. coli* on four dates during the sampling period, and the geometric mean for the year also exceeded its WQS.

The upper Pomperaug River (CT6800-00_03) is a Class B freshwater river. Designated uses include habitat for fish and other aquatic life and wildlife, recreation, navigation, and industrial and agricultural water supply. Water quality analyses were conducted using data from one sampling location from 2006-2009 (Station 934) (Table 2). The water quality criteria for *E. coli*, along with bacteria sampling results from 2006-2009, for Station 934 are presented in Table 12. Single sample values for Station 934 exceeded the WQS for *E. coli* on eleven dates during the sampling period (2006 - 2009).

To aid in identifying possible bacteria sources, the geometric mean was also calculated for wet-weather and dry-weather sampling days for each sampling station (Tables 11 and 12). Bacteria concentrations at Station 1313 were significantly higher in wet-weather than dry, as shown by geometric means of 838 and 204, respectively. Likewise, the geometric mean for Station 934 for each year exceeded its WQS. Bacteria concentrations were higher in wet-weather than dry, as shown by geometric means of 476 and 201, respectively.

Due to the elevated bacteria measurements presented in Tables 11 and 12, these impaired segments did not meet CT's bacteria WQS, was identified as impaired, and was placed on the CT List of Waterbodies Not Meeting Water Quality Standards, also known as the CT 303(d) Impaired Waters List. The Clean Water Act requires that all 303(d) listed waters undergo a TMDL assessment that describes the impairments and identifies the measures needed to restore water quality. The goal is for all waterbodies to comply with State WQS.

Figure 5: Aerial map of the Pomperaug River



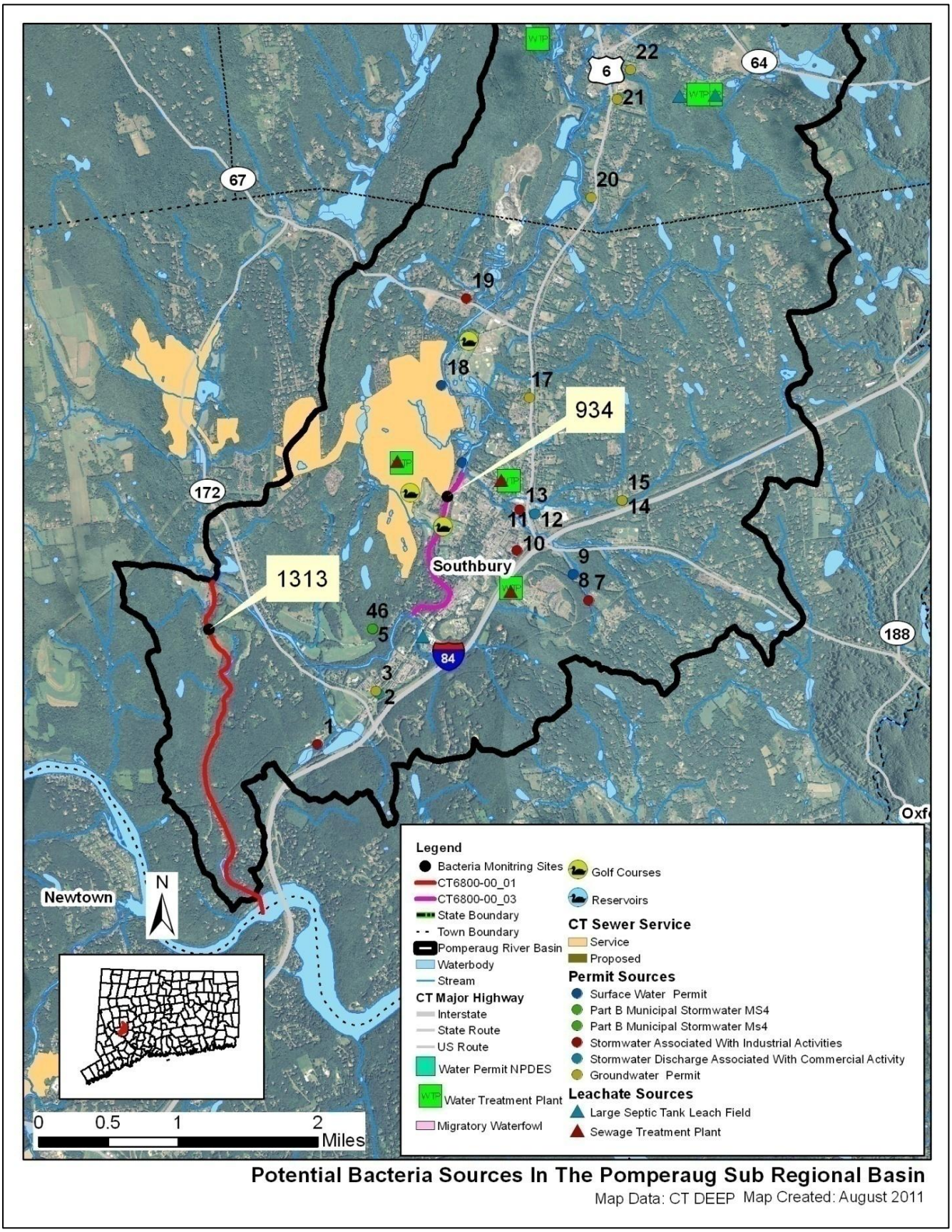
POTENTIAL BACTERIA SOURCES

Potential sources of indicator bacteria in a watershed include point and non-point sources, such as stormwater runoff, agriculture, sanitary sewer overflows (collection system failures), illicit discharges, and inappropriate discharges to the waterbody. Potential sources that have been tentatively identified in the watershed based on land use (Figures 3 and 4) and a collection of local information for the impaired waterbody is presented in Table 3 and Figure 6. However, the list of potential sources is general in nature and should not be considered comprehensive. There may be other sources not listed here that contribute to the observed water quality impairment in the study segments. Further monitoring and investigation will confirm listed sources and discover additional ones. Some segments in this watershed may be listed as unassessed by CT DEEP procedures. This does not suggest that there are no potential issues on this segment, but indicates a lack of current data to evaluate the segment as part of the assessment process. For some segments, there are data from permitted sources, and CT DEEP recommends that any elevated concentrations found from those permitted sources be addressed through voluntary reduction measures. More detailed evaluation of potential sources is expected to become available as activities are conducted to implement these TMDLs.

Table 3: Potential bacteria sources in the Pomperaug River watershed

Impaired Segment	Permit Source	Illicit Discharge	CSO/SSO Issue	Failing Septic System	Agricultural Activity	Stormwater Runoff	Nuisance Wildlife/Pets	Other
Pomperaug River CT6800-00_01	**x**	**x**		**x**	**x**	**x**	**x**	
Pomperaug River CT6800-00_03	**x**	**x**		**x**	**x**	**x**	**x**	

Figure 6: Potential sources in the Pomperaug River watershed at the sub-regional level



The potential sources map for the impaired basin was developed after thorough analysis of available data sets. If information is not displayed in the map, then no sources were discovered during the analysis. The following is the list of potential sources that were evaluated: problems with migratory waterfowl, golf course locations, reservoirs, proposed and existing sewer service, cattle farms, poultry farms, permitted sources of bacteria loading (surface water discharge, MS4 permit, industrial stormwater, commercial stormwater, groundwater permits, and construction related stormwater), and leachate and discharge sources (agricultural waste, CSOs, failing septic systems, landfills, large septic tank leach fields, septage lagoons, sewage treatment plants, and water treatment or filter backwash).

Point Sources

Permitted sources within the watershed that could potentially contribute to the bacteria loading are identified in Table 4. This table includes permit types that may or may not be present in the impaired watershed. A list of active permits in the watershed is included in Table 5. Additional investigation and monitoring may reveal the presence of additional discharges in the watershed. Available effluent data from each of these permitted categories found within the watershed are compared to the CT State WQS for the appropriate receiving waterbody use and type. When available, bacteria data results from these permitted sources are listed in Tables 5 and 8.

Table 4: General categories list of other permitted discharges

Permit Code	Permit Description Type	Number in watershed
CT	Surface Water Discharges	8
GPL	Discharge of Swimming Pool Wastewater	0
GSC	Stormwater Discharge Associated with Commercial Activity	3
GSI	Stormwater Associated with Industrial Activity	6
GSM	Part B Municipal Stormwater MS4	3
GSN	Stormwater Registration – Construction	0
LF	Groundwater Permit (Landfill)	0
UI	Underground Injection	8

Permitted Sources

As shown in Table 6, there are multiple permitted discharges in the Pomperaug River watershed, and bacteria data from 2001 – 2002 are included here. Though this data cannot be compared to a water quality standard as Connecticut does not have a fecal coliform recreational water quality standard, three samples (two from Southbury and one from Woodbury) showed high bacteria concentrations, exceeding 1,000 colonies/100 mL.

Since the MS4 permits are not targeted to a specific location, but the geographic area of the regulated municipality, there is no one accurate location on the map to display the location of these permits. One dot will be displayed at the geographic center of the municipality as a reference point. Sometimes this location falls outside of the targeted watershed and therefore the MS4 permit will not be displayed in the Potential Sources Map. Using the municipal border as a guideline will show which areas of an affected watershed are covered by an MS4 permit.

Table 5: Permitted facilities within the Pomperaug River watershed

Town	Client	Permit ID	Permit Type	Site Name/Address	Map #
Southbury	Greenhouse Condominium Assoc., Inc., Perillo's Tax/Bookkeeping Llc	UI0000119	Groundwater Permit	Wstwtr 001 Greenhouse Condo	14
Southbury	Greenhouse Condominium Assoc., Inc., Perillo's Tax/Bookkeeping Llc	UI0000119	Groundwater Permit	Greenhouse Condominium Association	15
Southbury	Southhaven Associates, Llc	UI0000120	Groundwater Permit	Southbury Plaza	11
Southbury	Old Field Association, Inc.	UI0000163	Groundwater Permit	Old Field Condominiums	17
Southbury	Southbury 84 Associates	UI0000299	Groundwater Permit	Southbury Green	3
Southbury	Town Of Southbury	200902866	Part B Municipal Stormwater MS4	Southbury, Town Of	4
Southbury	Town Of Southbury	200904010	Part B Municipal Stormwater MS4	Southbury, Town Of	5
Southbury	Town Of Southbury	GSM000028	Part B Municipal Stormwater Ms4	Southbury, Town Of	N/A(6)
Southbury	State Of Connecticut Department Of Transportation	GSI000061	Stormwater Associated With Industrial Activities	Southbury Maintenance Facility	13
Southbury	St. Pierre Oil Company Inc	GSI000266	Stormwater Associated With Industrial Activities	St Pierre Oil Company	10
Southbury	The Romatic Manufacturing Company	GSI000422	Stormwater Associated With Industrial Activities	Romatic Manufacturing Co., Inc	1
Southbury	O & G Industries, Inc.	GSI000588	Stormwater Associated With Industrial Activities	Southbury Quarry	19
Southbury	Town Of Southbury	GSI001531	Stormwater Associated With Industrial Activities	Southbury Transfer Station	7
Southbury	IBM Corporation	GSC000012	Stormwater Discharge Associated With Commercial Activity	IBM Corporation	8
Southbury	Southhaven Associates, Llc	GSC000112	Stormwater Discharge Associated With Commercial Activity	Southbury Plaza	12

Table 5: Permitted facilities within the Pomperaug River watershed (continued)

Town	Client	Permit ID	Permit Type	Site Name/Address	Map #
Southbury	Southbury 84 Associates	GSC000159	Stormwater Discharge Associated With Commercial Activity	Southbury Green Shopping Center	2
Southbury	IBM Corporation	CT0026212	Surface Water Permit	IBM Corporation	9
Southbury	The Heritage Village Water Company	CT0101133	Surface Water Permit	Heritage Water Company	16
Southbury	The Heritage Village Water Company	CT0101133	Surface Water Permit	Heritage Village Sewage Trtmnt	18
Woodbury	Woodbury Place Condominium Association, Inc.	UI0000071	Groundwater Permit	Woodbury Place Condominium Assoc	20
Woodbury	Woodbury Interfaith Elderly Housing Corporation	UI0000171	Groundwater Permit	Spruce Bank Farm	21
Woodbury	South Brook Homeowners Association, Inc.	UI0000308	Groundwater Permit	The Views	22
Woodbury	O & G Industries, Inc.	GSI000590	Stormwater Associated With Industrial Activities	O & G Park Road Quarry	23

Table 6: Industrial permits in the Pomperaug River watershed and available fecal coliform data (colonies/100 mL). The results cannot be compared to the water quality standard as there is no recreation standard for fecal coliform.

Town	Location	Permit Number	Receiving Water	Sample Location	Sample Date	Result
Southbury	Romatic Mfg Co	GSI422	Pomperaug River	Outfall 001	07/17/01	10
Southbury	Romatic Mfg Co	GSI422	Pomperaug River	Outfall 001	10/11/02	1,550
Southbury	Romatic Mfg Co	GSI422	Pomperaug River	Outfall 003	07/17/01	90
Southbury	Romatic Mfg Co	GSI422	Pomperaug River	Outfall 003	10/11/02	>2,000
Woodbury	O & G Industries Inc.	GSI590	trib to Pomperaug R	swale from detention basin, park road quarry	09/14/01	8,000

Municipal Stormwater Permitted Sources

Per the EPA Phase II Stormwater rule all municipal storm sewer systems (MS4s) operators located within US Census Bureau Urbanized Areas (UAs) must be covered under MS4 permits regulated by the appropriate State agency. There is an EPA waiver process that municipalities can apply for to not

participate in the MS4 program. In Connecticut, EPA has granted such waivers to 19 municipalities. All participating municipalities within UAs in Connecticut are currently regulated under MS4 permits by CT DEEP staff in the MS4 program.

The US Census Bureau defines a UA as a densely settled area that has a census population of at least 50,000. A UA generally consists of a geographic core of block groups or blocks that exceeds the 50,000 people threshold and has a population density of at least 1,000 people per square mile. The UA will also include adjacent block groups and blocks with at least 500 people per square mile. A UA consists of all or part of one or more incorporated places and/or census designated places, and may include additional territory outside of any place. (67 FR 11663)

For the 2000 Census a new geographic entity was created to supplement the UA blocks of land. This created a block known as an Urban Cluster (UC) and is slightly different than the UA. The definition of a UC is a densely settled area that has a census population of 2,500 to 49,999. A UC generally consists of a geographic core of block groups or blocks that have a population density of at least 1,000 people per square mile, and adjacent block groups and blocks with at least 500 people per square mile. A UC consists of all or part of one or more incorporated places and/or census designated places; such a place(s) together with adjacent territory; or territory outside of any place. The major difference is the total population cap of 49,999 people for a UC compared to >50,000 people for a UA. (67 FR 11663)

While it is possible that CT DEEP will be expanding the reach of the MS4 program to include UC municipalities in the near future they are not currently under the permit. However, the GIS layers used to create the MS4 maps in this Statewide TMDL did include both UA and UC blocks. This factor creates some municipalities that appear to be within an MS4 program that are not currently regulated through an MS4 permit. This oversight can explain a municipality that is at least partially shaded grey in the maps and there are no active MS4 reporting materials or information included in the appropriate appendix. While these areas are not technically in the MS4 permit program, they are still considered urban by the cluster definition above and are likely to contribute similar stormwater discharges to affected waterbodies covered in this TMDL.

As previously noted, EPA can grant a waiver to a municipality to preclude their inclusion in the MS4 permit program. One reason a waiver could be granted is a municipality with a total population less than 1000 people, even if the municipality was located in a UA. There are 19 municipalities in Connecticut that have received waivers, this list is: Andover, Bozrah, Canterbury, Coventry, East Hampton, Franklin, Haddam, Killingworth, Litchfield, Lyme, New Hartford, Plainfield, Preston, Salem, Sherman, Sprague, Stafford, Washington, and Woodstock. There will be no MS4 reporting documents from these towns even if they are displayed in an MS4 area in the maps of this document.

The list of US Census UCs is defined by geographic regions and is named for those regions, not necessarily by following municipal borders. In Connecticut the list of UCs includes blocks in the following Census Bureau regions: Colchester, Danielson, Lake Pocotopaug, Plainfield, Stafford, Storrs, Torrington, Willimantic, Winsted, and the border area with Westerly, RI (67 FR 11663). Any MS4 maps showing these municipalities may show grey areas that are not currently regulated by the CT DEEP MS4 permit program.

The impaired segments in the Pomperaug River watershed are located within Southbury, CT. Southbury has a designated urban area, as defined by the U.S. Census Bureau, and is required to comply with the General Permit for the Discharge of Stormwater from Small Municipal Storm Sewer Systems (MS4 permit) issued by the CT DEEP (Figure 7).

Multiple MS4 outfalls have been sampled for *E. coli* bacteria in the watershed (Table 7). In Southbury, 7 MS4 outfalls were sampled from 2005 - 2011. Of these outfalls, 6 exceeded the single sample water quality standard of 410 colonies/100 mL on at least one sample date. In Woodbury, five MS4 outfalls were sampled in 2005 – 2008. None of the outfalls exceeded the single sample water quality standard for E. coli bacteria.

Publicly Owned Treatment Works

As shown in Figures 9 and 11, there are eight publicly owned treatment works (POTWs), or wastewater treatment plants, in the Pomperaug River watershed. Three POTWs in Southbury are near Segment 3. None appear to discharge directly to the impaired segment.

Figure 7: MS4 areas of the Pomperaug River watershed

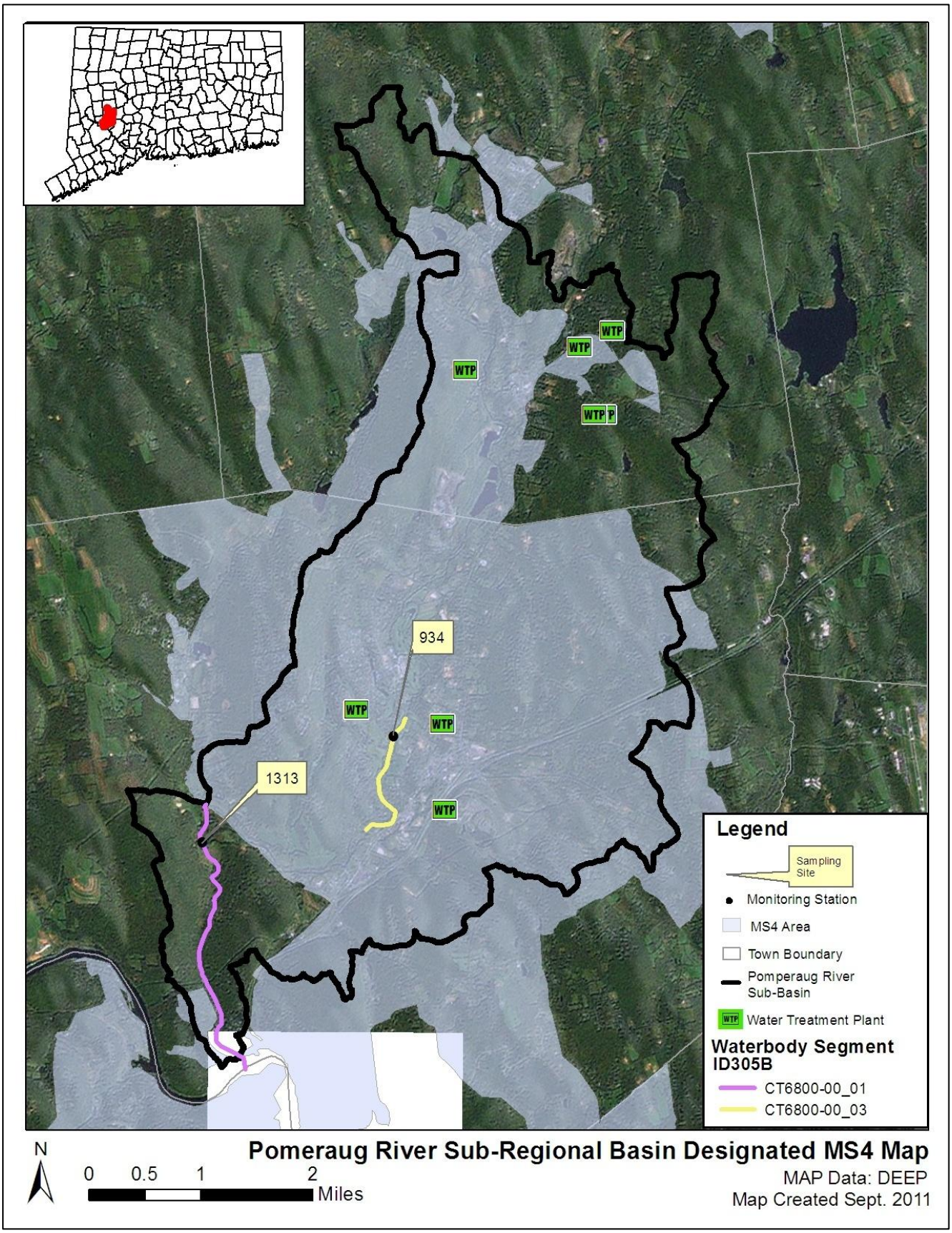


Table 7: List of MS4 sample locations and *E. coli* (colonies/100 mL) results in the Pomperaug River watershed

Town	Location	MS4 Type	Receiving Waters	Sample Date	Result
Southbury	outfall 1 Traditions Subdivision, S side of Spruce Brook Rd	Residential	Pomperaug River	04/27/05	10
Southbury	outfall 1 Traditions Subdivision, S side of Spruce Brook Rd	Residential	Pomperaug River	09/15/05	>60
Southbury	outfall 1 Traditions Subdivision, S side of Spruce Brook Rd	Residential	Pomperaug River	09/14/06	>1200
Southbury	outfall 1 Traditions Subdivision, S side of Spruce Brook Rd	Residential	Pomperaug River	09/11/07	>2000
Southbury	outfall 1 Traditions Subdivision, S side of Spruce Brook Rd	Residential	Pomperaug River	09/26/08	390
Southbury	outfall 1 Traditions Subdivision, S side of Spruce Brook Rd	Residential	Pomperaug River	10/07/09	>24,200
Southbury	outfall 1 Traditions Subdivision, S side of Spruce Brook Rd	Residential	Pomperaug River	09/16/10	>24,200
Southbury	outfall 1 Traditions Subdivision, S side of Spruce Brook Rd	Residential	Pomperaug River	10/03/11	1,054
Southbury	outfall 2 River Trail	Residential	Pomperaug River	09/14/06	240
Southbury	outfall 2 River Trail	Residential	Pomperaug River	09/11/07	>2000
Southbury	outfall 2 River Trail	Residential	Pomperaug River	09/26/08	>24200
Southbury	outfall 2 River Trail	Residential	Pomperaug River	10/07/09	480
Southbury	outfall 2 River Trail	Residential	Pomperaug River	09/16/10	400
Southbury	outfall 2 River Trail	Residential	Pomperaug River	10/03/11	2,187
Southbury	outfall 2 Wheeler Rd N of intersection with East Hill Road	Residential	Pomperaug River tributary	04/27/05	30
Southbury	outfall 2 Wheeler Rd N of intersection with East Hill Road	Residential	Pomperaug River tributary	09/15/05	220
Southbury	outfall 3 River Trail Adj to park on W side of River Trail	Commercial	Pomperaug River	04/27/05	>600
Southbury	outfall 3 River Trail Adj to park on W side of River Trail	Commercial	Pomperaug River	09/15/05	>60
Southbury	outfall 3 River Trail Adj to park on W side of River Trail	Commercial	Pomperaug River tributary	09/14/06	>1200
Southbury	outfall 3 River Trail Adj to park on W side of River Trail, west of road	Commercial	Pomperaug River tributary	09/11/07	>2000

Table 7: List of MS4 sample locations and *E. coli* (colonies/100 mL) results in the Pomperaug River watershed (continued)

Town	Location	MS4 Type	Receiving Waters	Sample Date	Result
Southbury	outfall 3 River Trail Adj to park on W side of River Trail, west of road	Commercial	Pomperaug River tributary	09/26/08	410
Southbury	outfall 3 River Trail Adj to park on W side of River Trail, west of road	Commercial	Pomperaug River	10/07/09	550
Southbury	outfall 3 River Trail Adj to park on W side of River Trail, west of road	Commercial	Pomperaug River	09/16/10	220
Southbury	outfall 3 River Trail Adj to park on W side of River Trail, west of road	Commercial	Pomperaug River	10/03/11	450
Southbury	outfall 4 heritage village behind 574 heritage office building	Commercial	Pomperaug River	04/27/05	50
Southbury	outfall 4 heritage village behind 574 heritage office building	Commercial	Pomperaug River	09/15/05	>60
Southbury	outfall 4 heritage village behind 574 heritage office building	Commercial	Pomperaug River	09/14/06	80
Southbury	outfall 4 heritage village behind 574 heritage office building	Commercial	Pomperaug River	09/11/07	>2000
Southbury	outfall 4 heritage village behind 574 heritage office building	Commercial	Pomperaug River	09/26/08	>24200
Southbury	outfall 4 heritage village behind 574 heritage office building	Commercial	Pomperaug River	10/07/09	7,270
Southbury	outfall 4 heritage village behind 574 heritage office building	Commercial	Pomperaug River	09/16/10	14,140
Southbury	outfall 4 heritage village behind 574 heritage office building	Commercial	Pomperaug River	10/03/11	51
Southbury	outfall 5 Oak Tree Rd	Industrial	Pomperaug River trib	10/07/09	190
Southbury	outfall 5 Oak Tree Rd	Industrial	Pomperaug River trib	09/16/10	570
Southbury	outfall 5 Oak Tree Rd	Industrial	Pomperaug River trib	10/03/11	122
Southbury	outfall 5 Oak Tree Rd 18" corrugated metal outfall adj to package store	Industrial	Pomperaug River trib	09/14/06	440
Southbury	outfall 5 Oak Tree Rd 18" corrugated metal outfall adj to package store	Industrial	Pomperaug River trib	09/11/07	>2000
Southbury	outfall 5 Oak Tree Rd 18" corrugated metal outfall adj to package store	Industrial	Pomperaug River trib	09/26/08	2,060
Southbury	outfall 5 Oak Tree Rd, 18"corrugated metal outfall adj to package store	Industrial	Pomperaug River trib	04/27/05	>600

Table 7: List of MS4 sample locations and *E. coli* (colonies/100 mL) results in the Pomperaug River watershed (continued)

Town	Location	MS4 Type	Receiving Waters	Sample Date	Result
Southbury	outfall 5 Oak Tree Rd, 18"corrugated metal outfall adj to package store	Industrial	Pomperaug River trib	09/15/05	>60
Southbury	outfall 6 East Hill Rd adj to 1035 &1039 Heritage Village	Industrial	Pomperaug River trib	09/14/06	140
Southbury	outfall 6 East Hill Rd adj to 1035 &1039 Heritage Village	Industrial	Pomperaug River trib	09/11/07	>20000
Southbury	outfall 6 East Hill Rd adj to 1035 &1039 Heritage Village	Industrial	Pomperaug River trib	09/26/08	630
Southbury	outfall 6 East Hill Rd adj to 1035 and 1039 Heritage Village	Industrial	Pomperaug River trib	04/27/05	50
Southbury	outfall 6 East Hill Rd adj to 1035 and 1039 Heritage Village	Industrial	Pomperaug River trib	10/07/09	6,490
Southbury	outfall 6 East Hill Rd adj to 1035 and 1039 Heritage Village	Industrial	Pomperaug River trib	09/16/10	>24,200
Southbury	outfall 6 East Hill Rd adj to 1035 and 1039 Heritage Village	Industrial	Pomperaug River trib	10/03/11	262
Woodbury	bacon Pond Rd/Joshua Hill culvert from cole bros	Industrial	Pomperaug River	10/17/06	52
Woodbury	bacon Pond Rd/Joshua Hill culvert from cole bros	Industrial	Pomperaug River	10/28/06	73
Woodbury	bacon Pond Rd/Joshua Hill culvert from cole bros	Industrial	Pomperaug River	10/24/05	40
Woodbury	Main St South (Milestone)	Commercial	Pomperaug River	11/06/07	38
Woodbury	O&G Pond near site/feeding to Pomperaug	Industrial	Pomperaug River	10/28/06	45
Woodbury	O&G Pond near site/feeding to Pomperaug-Stiles Rd	Industrial	Pomperaug River	10/17/06	52
Woodbury	O&G Stiles Rd outlet of Pond to Pomperaug River	Industrial	Pomperaug River	10/24/05	29
Woodbury	South Brook Rt 6 @ Popmperaug	Industrial	Pomperaug River	10/28/06	61
Woodbury	South Pomperpaug Ave & Rt 6	Commercial	Pomperaug River	10/17/06	44
Woodbury	South Pomperpaug Ave & Rt 6	Commercial	Pomperaug River	11/25/08	100
Shaded cells indicate an exceedance of single-sample based water quality criteria (410 colonies/100 mL)					

Non-point Sources

Non-point source pollution (NPS) comes from many diffuse sources and is more difficult to identify and control. NPS pollution is often associated with land-use practices. Examples of NPS that can contribute bacteria to surface waters include insufficient septic systems, pet and wildlife waste, agriculture, and contact recreation (swimming or wading). Potential sources of NPS within the Pomperaug River watershed are described below.

Insufficient Septic Systems

As shown in Figure 6, only a small portion of the central watershed relies on a municipal sewer system. The majority of the watershed, including most of the area surrounding the impaired segments, relies on onsite wastewater treatment systems, such as septic systems. Insufficient or failing septic systems can be significant sources of bacteria by allowing raw waste to reach surface waters. In Connecticut, local health directors or health districts are responsible for keeping track of any reported insufficient or failing septic systems in a specific municipality. Woodbury and Southbury are served by the Pomperaug District (http://pomperaughealthdistrict.org).

Wildlife and Domestic Animal Waste

Wildlife and domestic animals within the Pomperaug River watershed represent another potential source of bacteria to the impaired waterbodies. Elevated bacteria levels that are due solely to a natural population of wildlife are not subject to the WQS. Any exacerbation of wildlife population sizes or residency times influenced by human activities are subject to the CT WQS and TMDL provisions.

With the construction of roads and drainage systems, these wildlife wastes may no longer be retained on the landscape, but instead may be conveyed via stormwater to the nearest surface waterbody. As such these physical land alterations can exacerbate the impact of natural sources on water quality (USEPA, 2001). As the majority of the watershed is undeveloped, wildlife waste is a potential source of bacteria in the Pomperaug River watershed.

There are two golf courses (Pomperaug Golf Club and Heritage Country Club) and several public parks (Platt Park, Cedarland Park, George Ewald Park, and Ballantine Park), plus large expanses of lawn, alongside the upper Pomperaug River (CT6800-00_03). There are additional golf courses, recreation fields, and parks just upstream of Segment 3. Geese and other waterfowl are known to congregate in open areas, including recreational fields, agricultural crop fields, and golf courses. In addition to creating a nuisance, large numbers of geese can also create unsanitary conditions on the grassed areas and cause water quality problems due to bacterial contamination associated with their droppings. Large populations of geese can also lead to habitat destruction as a result of overgrazing on wetland and riparian plants.

The central part of the watershed around the upper Pomperaug River (CT6800-00_03) consists of dense residential development in Southbury. Waste from domestic animals, such as dogs, may also be contributing to bacteria concentrations in that area.

Agricultural Activities

Agricultural operations are an important economic activity and landscape feature in many areas of the State. Runoff from agricultural fields may contain pollutants such as bacteria and nutrients (USEPA, 2011a). Though agricultural land use makes up only 5% of the Pomperaug River watershed, there are several agricultural fields indicated on the land use map in the southern section of the impaired segment

of the Pomperaug River just upstream of the lower impaired segment (Figure 4). Agricultural runoff is a potential source of bacteria to the Pomperaug River.

Stormwater Runoff from Developed Areas

The majority of the Pomperaug River watershed is undeveloped. However, approximately 30% of the land use in the watershed is considered urban, including most of the area around the upper impaired segment (Figures 3 and 4). Urban areas are often characterized by impervious cover, or surface areas such as roofs and roads that force water to run off land surfaces rather than infiltrate into the soil. Studies have shown a link between increasing impervious cover and degrading water quality conditions in a watershed (CWP, 2003). In one study, researchers correlated the amount of fecal coliform to the percent of impervious cover in a watershed (Mallin *et al.*, 2000).

Just over half of the Pomperaug River watershed has less than 6% impervious surfaces (Figure 8), including the area around the lower impaired stream segment. However, the central portion of the watershed near the upper impaired segment shows higher levels of imperviousness, some of which falls in the highest category of greater than 16% impervious cover, suggesting that stormwater runoff may be a source of bacteria to the this impaired segment (Figure 9).

Figure 8: Range of impervious cover (%) in the Pomperaug River watershed

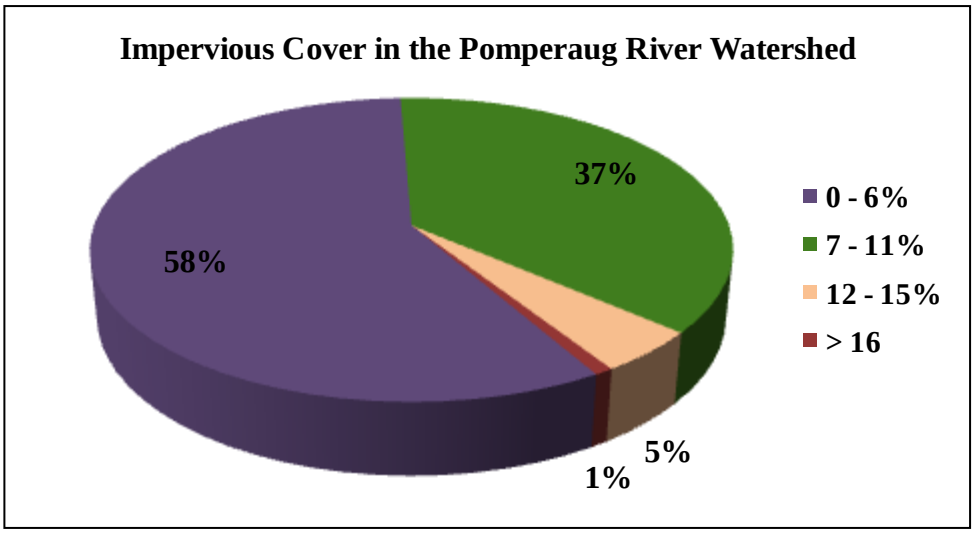
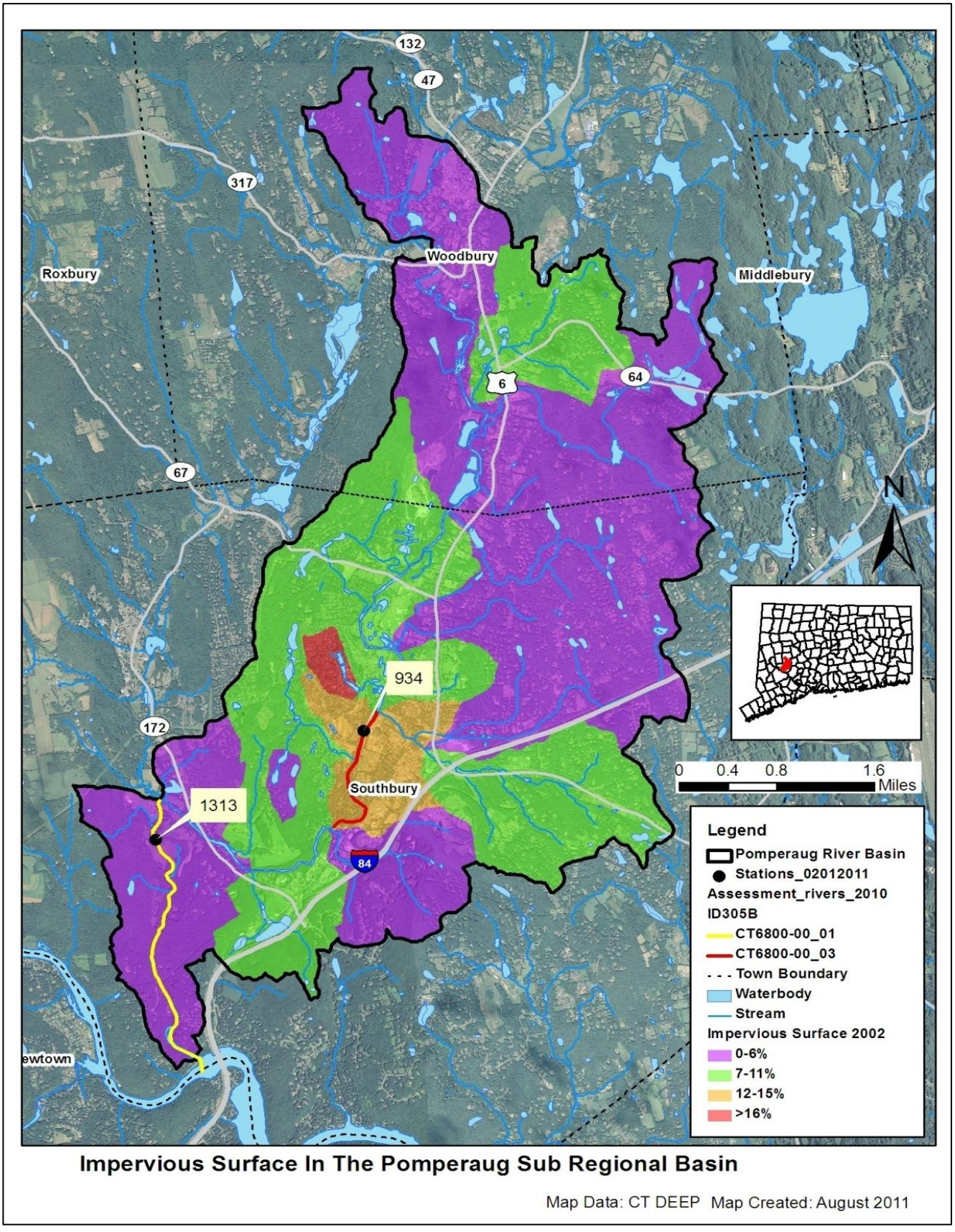


Figure 9: Impervious cover (%) for the Pomperaug River sub-regional watershed



Additional Sources

There may be other sources not listed here or identified in Figure 6 that contribute to the observed water quality impairment in the Pomperaug River watershed. Further monitoring and investigation will confirm the listed sources and discover additional ones. More detailed evaluation of potential sources is expected to become available as activities are conducted to implement this TMDL.

Land Use/Landscape

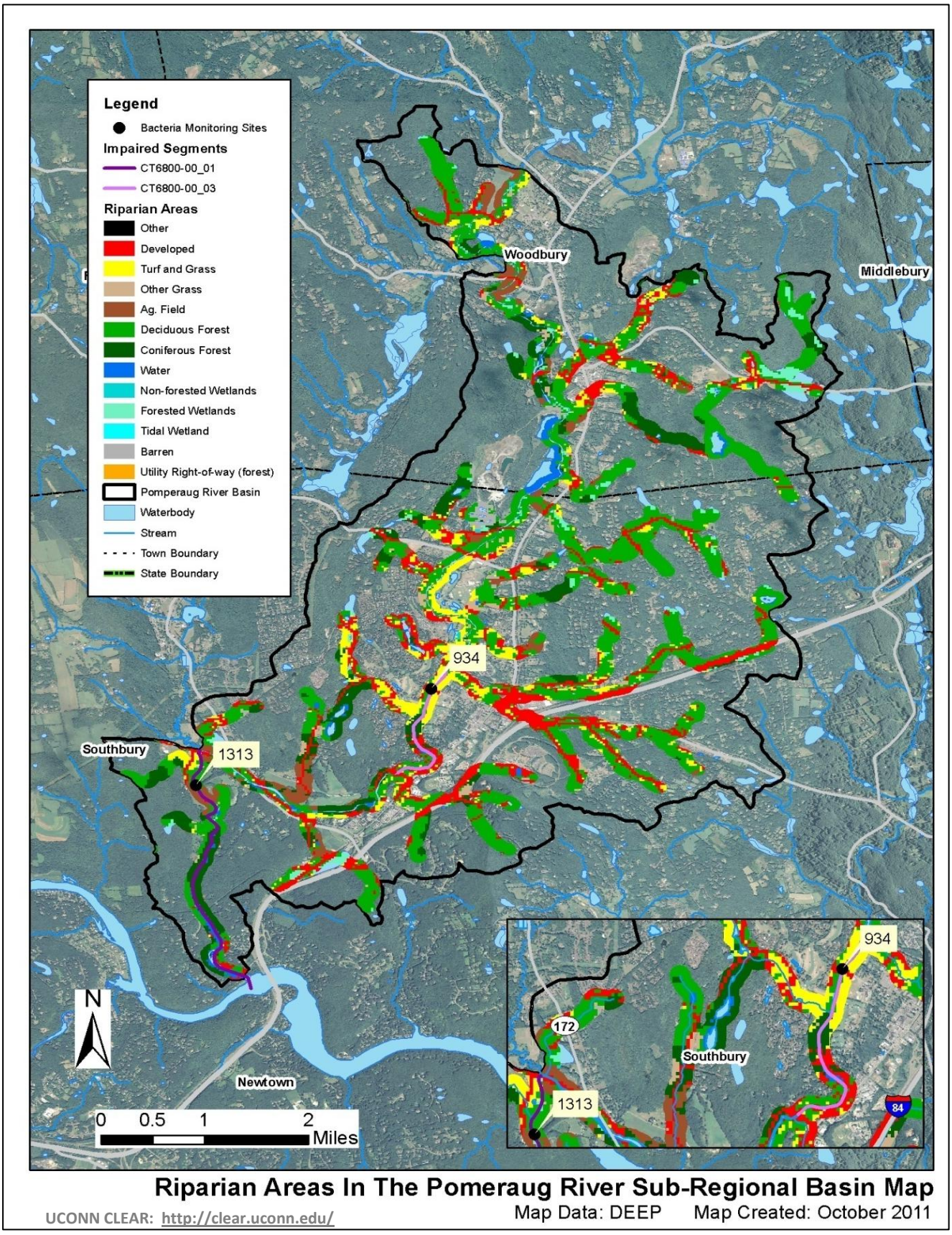
Riparian Buffer Zones

The riparian buffer zone is the area of land located immediately adjacent to streams, lakes, or other surface waters. The boundary of the riparian zone and the adjoining uplands is gradual and not always well-defined. However, riparian zones differ from uplands because of high levels of soil moisture, frequent flooding, and the unique assemblage of plant and animal communities found there. Through the interaction of their soils, hydrology, and vegetation, natural riparian areas influence water quality as contaminants are taken up into plant tissues, adsorbed onto soil particles, or modified by soil organisms. Any change to the natural riparian buffer zone can reduce the effectiveness of the natural buffer and has the potential to contribute to water quality impairment (USEPA, 2011b).

The CLEAR program at UCONN has created streamside buffer layers for the entire State of Connecticut (http://clear.uconn.edu/), which have been used in this TMDL. Analyzing this information can reveal potential sources and implementation opportunities at a localized level. The land use directly adjacent to a waterbody can have direct impacts on water quality from surface runoff sources.

The riparian zones for the upper impaired segment of the Pomperaug River are dominated by turf and grass, with additional urban and forested lands (Figure 10). Developed areas within the riparian zone likely contribute pollutants such as bacteria to the waterbody and indicate that the natural riparian buffer is not available to treat this runoff. Additionally, turf and grass can be frequented by waterfowl. The lower impaired segment is characterized primarily by forest, with a small amount of agricultural lands near the upstream portion. As previously noted, waste from wildlife in non-developed areas can contribute bacteria to nearby waterbodies, though much of this waste may be treated by the natural vegetated buffer.

Figure 10: Riparian buffer zone information for the Pomperaug River watershed



CURRENT MANAGEMENT ACTIVITIES

As indicated previously, all of Southbury and Woodbury are regulated under the MS4 program. The MS4 General Permit is required for any municipality with urbanized areas that initiates, creates, originates or maintains any discharge of stormwater from a storm sewer system to waters of the State. The MS4 permit requires towns to design a Stormwater Management Plan (SMP) to reduce the discharge of pollutants in stormwater to improve water quality. The plan must address the following 6 minimum measures:

1. Public Education and Outreach.
2. Public Involvement/Participation.
3. Illicit discharge detection and elimination.
4. Construction site stormwater runoff control.
5. Post-construction stormwater management in the new development and redevelopment.
6. Pollution prevention/good housekeeping for municipal operations.

Each town is also required to submit an annual update outlining the steps they are taking to meet the six minimum measures. All updates that address bacterial contamination in the watershed are summarized in Tables 8 – 9. In addition to the updates listed in the tables, the Towns of Southbury and Woodbury each sampled six stormwater outfalls during wet-weather.

Table 8: Summary of MS4 requirement updates related to the reduction of bacterial contamination from Southbury, CT

Minimum Measure	Southbury Stormwater Management Plan Annual Report Update
Public Outreach and Education	1) Audubon Center at Bent of the River held a variety programs on water quality, reaching reaching over 700 school-aged children, and over 300 adults. 2) A "stormwater" page was added to Southbury's website, and the 2010 Stormwater Management Plan was posted. 3) The Town of Southbury has contributed $245,000 to Pomperaug River Watershed Coalition since 2005 in support of water quality programs, including $38,000 in 2010.
Public Involvement and Participation	1) The Pomperaug River Watershed Coalition conducted 49 programs to reach 1,429 citizens in 2009; and 69 programs to reach 2,065 citizens in 2010. 2) The Pomperaug River Watershed Coalition estimate over 280,000 people were reached through their mass media efforts. 3) Pomperaug River Watershed Coalition held a River Management Seminar for Residents in June 2008. 4) Storm drains along Main Street South were marked by Boy Scout Troop 1607.
Illicit Discharge Detection and Elimination	1) Some stormwater inlets and outfalls were mapped in 2010, in a collaborative effort between the Pomperaug River Watershed Coalition and Town of Southbury. 2) One residential illicit discharge (leaking fuel tank) was discovered in Southbury. 3) CVS Pharmacies throughout Connecticut, including in Southbury on Bullet Hill Road, were found to have conducted illicit discharges of photo chemicals into onsite wastewater systems in 2009-10.

Table 8: Summary of MS4 requirement updates related to the reduction of bacterial contamination from Southbury, CT (continued)

Minimum Measure	Southbury Stormwater Management Plan Annual Report Update
Construction Site Stormwater Runoff Control	1) Three subdivisions, two commercial, and seven residential plans were reviewed for municipal soil and erosion compliance in FY2009. 2) Approximately 110 site inspections by Southbury for erosion and sedimentation compliance. 3) Greatly improved permit tracking and GIS software, aerial photo data, and land use data methods were adopted by Southbury in 2010.
Post Construction Stormwater management	1) The town continued to track approximately 20 individual best management sites, including sending each year 3 clean-out reminders.
Pollution Prevention and Good Housekeeping	1) All streets were swept at least once in spring 2010, covering 244 curb miles, and removing 2,720 tons of material. 2) 150 curb miles of street were swept in fall 2010, removing 400 tons. 3) In 2009 and 2010 approximately 1,900 catch basins were cleaned using the Southbury's vacuum truck removing 1800 tons of material. 4) Southbury participated in regional Hazardous Waste & Mercury Exchange Programs in 2010. 5) Stormwater sampling at six outfalls was conducted on Sept 16, 2010.

Table 9: Summary of MS4 requirement updates related to the reduction of bacterial contamination from Woodbury, CT

Minimum Measure	Town of Woodbury Stormwater Management Report (2008)
Public Outreach and Education	1) The Town of Woodbury partners with the Pomperaug River Watershed Association for public education on watershed issues.
Public Involvement and Participation	1) No updates.
Illicit Discharge Detection and Elimination	1) A municipal illicit discharge and elimination program was fully adopted in 2008 by Woodbury. 2) Mapping of stormwater outfalls greater than 12" in diameter within the MS4 area is ongoing. Mapping of 15" or larger stormwater outfalls has been completed.
Construction Site Stormwater Runoff Control	1) Town of Woodbury Land Use Department conducts ongoing erosion and sedimentation review of plans during the pre-construction/pre-application process.
Post Construction Stormwater management	1) A system of "random inspection and visual analysis" is being used to address stormwater runoff from development.
Pollution Prevention and Good Housekeeping	1) 86 miles of municipal streets are swept each spring. 2) Municipal catch basins are cleaned on a rotational basins, so that one third are cleaned each year.

RECOMMENDED NEXT STEPS

The Towns of Southbury and Woodbury have developed and implemented programs to protect water quality from bacterial contamination. If these municipalities are not already working with the Pomperaug River Watershed Coalition (PRWC), they are encouraged to do so during future efforts. The PRWC has been involved in monitoring and education and outreach efforts in the basin. For more detailed information, view the group's website www.pomperaug.org. Future mitigative activities are necessary to ensure the long-term protection of the Pomperaug River and have been prioritized below.

1) Continue monitoring of permitted sources.

Previous sampling of discharge from permitted sources within the watershed has shown elevated levels of fecal coliform bacteria, an indicator of bacterial pollution (Tables 6, 7, 11 and 12). Further monitoring will provide information essential to better locate, understand, and reduce pollution sources. If any current monitoring is not done with appropriate bacterial indicator based on the receiving water, then a recommended change during the next permit reissuance is to include the appropriate indicator species. If facility monitoring indicates elevated bacteria, then implementation of permit required, and voluntary measures to identify and reduce sources of bacterial contamination at the facility are an additional recommendation. Regular monitoring should be established for all permitted sources to ensure compliance with permit requirements and to determine if current requirements are adequate or if additional measures are necessary for water quality protection.

Section 6(k) of the MS4 General Permit requires a municipality to modify their Stormwater Management Plan to implement the TMDL within four months of TMDL approval by EPA if stormwater within the municipality contributes pollutant(s) in excess of the allocation established by the TMDL. For discharges to impaired waterbodies, the municipality must assess and modify the six minimum measures of its plan, if necessary, to meet TMDL standards. Particular focus should be placed on the following plan components: public education, illicit discharge detection and elimination, stormwater structures cleaning, and the repair, upgrade, or retrofit of storm sewer structures. The goal of these modifications is to establish a program that improves water quality consistent with TMDL requirements. Modifications to the Stormwater Management Plan in response to TMDL development should be submitted to the Stormwater Program of DEEP for review and approval.

Table 10 details the appropriate bacteria criteria for use as waste load allocations established by this TMDL for use as water quality targets by permittees as permits are renewed and updated, within the Pomperaug watershed.

For any municipality subject to an MS4 permit and affected by a TMDL, the permit requires a modification of the SMP to include BMPs that address the included impairment. In the case of bacteria related impairments municipal BMPs could include: implementation or improvement to existing nuisance wildlife programs, septic system monitoring programs, any additional measures that can be added to the required illicit discharge detection and elimination (IDDE) programs, and increased street sweeping above basic permit requirements. Any non-MS4 municipalities can implement these same types of initiatives in effort to reduce bacteria source loading to impaired waterways.

Any facilities that discharge non-MS4 regulated stormwater should update their Pollution Prevention Plan to reflect BMPs that can reduce bacteria loading to the receiving waterway. These BMPs could include nuisance wildlife control programs and any installations that increase surface infiltration to reduce overall stormwater volumes. Facilities that are regulated under the Commercial Activities Stormwater Permit should report any updates to their SMP in their summary documentation submitted to DEEP.

Table 10. Bacteria (e.coli) TMDLs, WLAs, and LAs for Recreational Use

		Instantaneous *E. coli* (#/100mL)						Geometric Mean *E. coli* (#/100mL)	
Class	**Bacteria Source**	**WLA[6]**			**LA[6]**			**WLA[6]**	**LA[6]**
	Recreational Use	**1**	**2**	**3**	**1**	**2**	**3**	**All**	**All**
B[4]	Non-Stormwater NPDES	235	410	576				126	
	CSOs	235	410	576				126	
	SSOs	0	0	0				0	
	Illicit sewer connection	0	0	0				0	
	Leaking sewer lines	0	0	0				0	
	Stormwater (MS4s)	235[7]	410[7]	576[7]				126[7]	
	Stormwater (non-MS4)				235[7]	410[7]	576[7]		126[7]
	Wildlife direct discharge				235[7]	410[7]	576[7]		126[7]
	Human or domestic animal direct discharge[5]				235	410	576		126

(1) **Designated Swimming.** Procedures for monitoring and closure of bathing areas by State and Local Health Authorities are specified in: Guidelines for Monitoring Bathing Waters and Closure Protocol, adopted jointly by the Department of Environmental Protections and the Department of Public Health. May 1989. Revised April 2003 and updated December 2008.

(2) **Non-Designated Swimming.** Includes areas otherwise suitable for swimming but which have not been designated by State or Local authorities as bathing areas, waters which support tubing, water skiing, or other recreational activities where full body contact is likely.

(3) **All Other Recreational Uses.**

(4) Criteria for the protection of recreational uses in Class B waters do not apply when disinfection of sewage treatment plant effluents is not required consistent with Standard 23. (Class B surface waters located north of Interstate Highway I-95 and downstream of a sewage treatment plant providing seasonal disinfection May 1 through October 1, as authorized by the Commissioner.)

(5) Human direct discharge = swimmers

(6) Unless otherwise required by statute or regulation, compliance with this TMDL will be based on ambient concentrations and not end-of-pipe bacteria concentrations

(7) Replace numeric value with "natural levels" if only source is naturally occurring wildlife. Natural is defined as the biological, chemical and physical conditions and communities that occur within the environment which are unaffected or minimally affected by human influences (CT DEEP 2011a). Sections 2.2.2 and 6.2.7 of this Core Document deal with BMPs and delineating type of wildlife inputs.

2) Identify areas in the Pomperaug River watershed to implement Best Management Practices (BMPs) to control stormwater runoff.

As noted previously, 31% of the Pomperaug River watershed is considered urban and the towns within the Pomperaug River watershed are regulated by the MS4 program. Significant portions of the watershed in Southbury and Woodbury have an impervious cover between 7 – 11%. Areas of Southbury near the upper Pomperaug River impaired segment have higher impervious coverage, in places exceeding 16%. Stormwater runoff from the intensively developed urban areas is likely contributing bacteria to the waterbodies.

3) Evaluate municipal education and outreach programs regarding animal waste.

The impaired segments in the Pomperaug River watershed are surrounded by both developed and undeveloped lands. Education and outreach highlighting the importance of not feeding waterfowl and wildlife and managing waste from horses, dogs, and other pets is valuable in both settings. The town and residents can take measures to minimize waterfowl-related impacts, especially in the many parks and golf courses surrounding the river, by allowing tall, coarse vegetation to grow in the riparian areas of the impaired segments that are frequented by waterfowl. Waterfowl, especially grazers like geese, prefer easy access to water. Maintaining an uncut vegetated buffer along the shore will make the habitat less desirable to geese and encourage migration. In addition, any educational program should emphasize that feeding waterfowl, such as ducks, geese, and swans, may contribute to water quality impairments in the Pomperaug River watershed and can harm human health and the environment.

Animal wastes should be disposed of away from any waterbody or storm drain system. BMPs effective at reducing the impact of animal waste on water quality include installing signage, providing pet waste receptacles in high-uses areas, enacting ordinances requiring the clean-up of pet waste, and targeting educational and outreach programs in problem areas.

4) Implement a program to evaluate the sanitary sewer system.

Much of the area west of the upper Pomperaug River impaired segments is served by sanitary sewer system (Figure 6). It is important for Southbury to maintain a program to evaluate its sanitary sewer and reduce leaks and overflows. This program should include periodic inspections of the sewer line for leaks, infiltration and inflow, and other malfunctions that may release bacteria into the Pomperaug River.

5) Develop a system to monitor septic systems.

Most of the watershed is served by private septic systems. If not already in place, Southbury and Woodbury should establish a program to ensure that existing septic systems are properly operated and maintained. For instance, communities can create an inventory of existing septic systems through mandatory inspections. Inspections help encourage proper maintenance and identify failed and sub-standard systems. Policies that govern the eventual replacement of the sub-standard systems within a reasonable timeframe could also be adopted. Towns can also develop programs to assist citizens with the replacement and repair of older and failing systems.

6) Ensure there are sufficient buffers on agricultural lands along the Pomperaug River.

There are several areas along and immediately upstream of the impaired segments identified as agricultural lands. If not already in place, agricultural producers should work with the CT Department of Agriculture and the U.S. Department of Agriculture Natural Resources Conservation Service to develop conservation plans for their farming activities within the watershed. These plans should focus on ensuring that there are sufficient stream buffers, that fencing exists to restrict livestock and horse access to streams and wetlands, and that animal waste handling, disposal, and other appropriate Best Management Practices (BMPs) are in place. Particular attention should be paid to those agricultural operations located within the riparian buffer zone of the impaired segment of the lower Pomperaug River in the southern portion of the watershed (Figure 6).

BACTERIA DATA AND PERCENT REDUCTIONS TO MEET THE TMDL

Table 11: Pomperaug River Bacteria Data

Waterbody ID: CT-6800-00_01

Characteristics: Freshwater, Class B, Habitat for Fish and other Aquatic Life and Wildlife, Recreation, and Industrial and Agricultural Water Supply

Impairment: Recreation (*E. coli bacteria)*

Water Quality Criteria for E. coli:

Geometric Mean: 126 colonies/100 mL

Single Sample: 410 colonies/100ml (non-designated swimming areas)

Percent Reduction to meet TMDL:

Geometric Mean: **65%**

Single Sample: **90%**

Data: 2010 from CT DEEP targeted sampling efforts, 2012 TMDL Cycle

Single sample data from all monitoring stations on the Pomperaug River with annual geometric means calculated

Station Name	Station Location	Date	Results	Wet/Dry	Geomean
1313	Off Flagg Swamp Road	5/19/2010	500	wet	**359* (65%)**
1313	Off Flagg Swamp Road	6/9/2010	180	dry	
1313	Off Flagg Swamp Road	6/23/2010	1500	wet	
1313	Off Flagg Swamp Road	6/30/2010	220	dry	
1313	Off Flagg Swamp Road	7/8/2010	580†	dry	
1313	Off Flagg Swamp Road	7/14/2010	**4100 *† (90%)**	wet	
1313	Off Flagg Swamp Road	7/21/2010	160	wet	
1313	Off Flagg Swamp Road	8/4/2010	130	dry**	
1313	Off Flagg Swamp Road	8/12/2010	245†	dry**	
1313	Off Flagg Swamp Road	9/21/2010	98	dry**	

Shaded cells indicate an exceedance of water quality criteria

†Average of two duplicate samples

**** Weather conditions for selected data taken from Hartford because local station had missing data**

***Indicates single sample and geometric mean values used to calculate the percent reduction**

Wet and dry weather geometric mean values for all monitoring stations on the Pomperaug River

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
1313	Off Flagg Swamp Road	2010	4	6	359	838	204

Shaded cells indicate an exceedance of water quality criteria

Weather condition determined from rain gages in Danbury, CT and at Hartford Bradley International Airport

Table 12: Pomperaug River Bacteria Data

Waterbody ID: CT6800-00_03

Characteristics: Freshwater, Class B, Habitat for Fish and other Aquatic Life and Wildlife, Recreation, Navigation, and Industrial and Agricultural Water Supply

Impairment: Recreation (*E. coli bacteria)*

Water Quality Criteria for E. coli:

Geometric Mean: 126 colonies/100 mL

Single Sample: 410 colonies/100 mL

Percent Reduction to meet TMDL:

Geometric Mean: **75%**

Single Sample: **92%**

Data: 2006 - 2009 from CT DEEP targeted sampling efforts, 2012 TMDL Cycle

Single sample data from all monitoring stations on Pomperaug River with annual geometric means calculated

Station Name	Station Location	Date	Results	Wet/Dry	Geomean
934	Upstream of Poverty Road crossing	6/1/2006	180	wet	245
934	Upstream of Poverty Road crossing	6/14/2006	84	dry	
934	Upstream of Poverty Road crossing	6/29/2006	600	wet	
934	Upstream of Poverty Road crossing	7/12/2006	**5200* (92%)**	wet	
934	Upstream of Poverty Road crossing	7/19/2006	320	dry	
934	Upstream of Poverty Road crossing	7/26/2006	85†	wet**	
934	Upstream of Poverty Road crossing	8/2/2006	98	dry	
934	Upstream of Poverty Road crossing	8/9/2006	300	wet	
934	Upstream of Poverty Road crossing	8/14/2006	110	dry	
934	Upstream of Poverty Road crossing	8/23/2006	190	dry	
934	Upstream of Poverty Road crossing	6/6/2007	230†	dry	198
934	Upstream of Poverty Road crossing	6/12/2007	210	wet	
934	Upstream of Poverty Road crossing	6/27/2007	170	dry	
934	Upstream of Poverty Road crossing	7/5/2007	2100	wet	
934	Upstream of Poverty Road crossing	7/10/2007	110	dry	
934	Upstream of Poverty Road crossing	7/17/2007	610	dry	
934	Upstream of Poverty Road crossing	7/25/2007	120	dry	
934	Upstream of Poverty Road crossing	8/2/2007	130	dry	

Single sample data from all monitoring stations on Pomperaug River with annual geometric means calculated (continued)

Station Name	Station Location	Date	Results	Wet/Dry	Geomean
934	Upstream of Poverty Road crossing	8/9/2007	74	wet	
934	Upstream of Poverty Road crossing	8/30/2007	41	dry	
934	Upstream of Poverty Road crossing	9/6/2007	210	dry	
934	Upstream of Poverty Road crossing	9/13/2007	310	dry	
934	Upstream of Poverty Road crossing	5/22/2008	130	wet	
934	Upstream of Poverty Road crossing	6/5/2008	190	wet	
934	Upstream of Poverty Road crossing	6/9/2008	2500	wet	
934	Upstream of Poverty Road crossing	6/19/2008	350	dry**	
934	Upstream of Poverty Road crossing	6/26/2008	320	dry	
934	Upstream of Poverty Road crossing	7/8/2008	360	dry	**495* (75%)**
934	Upstream of Poverty Road crossing	7/23/2008	510	wet	
934	Upstream of Poverty Road crossing	7/31/2008	400	wet	
934	Upstream of Poverty Road crossing	8/4/2008	560	dry**	
934	Upstream of Poverty Road crossing	8/14/2008	305†	dry**	
934	Upstream of Poverty Road crossing	9/9/2008	5000	wet	
934	Upstream of Poverty Road crossing	6/11/2009	230	wet	
934	Upstream of Poverty Road crossing	6/17/2009	140	dry	
934	Upstream of Poverty Road crossing	7/2/2009	800	wet**	
934	Upstream of Poverty Road crossing	7/9/2009	560	dry**	
934	Upstream of Poverty Road crossing	7/16/2009	1000	wet**	307
934	Upstream of Poverty Road crossing	7/23/2009	290	wet**	
934	Upstream of Poverty Road crossing	8/6/2009	110	dry	
934	Upstream of Poverty Road crossing	8/12/2009	140	dry	
934	Upstream of Poverty Road crossing	8/19/2009	380	dry	

Shaded cells indicate an exceedance of water quality criteria

†Average of two duplicate samples

**** Weather conditions for selected data taken from Hartford because local station had missing data**

***Indicates single sample and geometric mean values used to calculate the percent reduction**

Wet and dry weather geometric mean values for all monitoring stations on the Pomperaug River

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
934	Upstream of Poverty Road crossing	2006-2009	18	24	291	476	201

Shaded cells indicate an exceedance of water quality criteria

Weather condition determined from rain gages in Danbury, CT and at Hartford Bradley International Airport

REFERENCES

Costa, Joe (2011). Calculating Geometric Means. Buzzards Bay National Estuary Program. **Online**: http://www.buzzardsbay.org/geomean.htm

CTDEEP (2010). State of Connecticut Integrated Water Quality Report. **Online:** http://www.ct.gov/dep/lib/dep/water/water_quality_management/305b/ctiwqr10final.pdf

CTDEEP (2011). State of Connecticut Water Quality Standards. **Online:** http://www.ct.gov/dep/lib/dep/water/water_quality_standards/wqs_final_adopted_2_25_11.pdf

CWP (2003). Impacts of Impervious Cover on Aquatic Systems. Center for Watershed Protection. **Online**: http://clear.uconn.edu/projects/tmdl/library/papers/Schueler_2003.pdf

Federal Register 67 (March 15, 2002) 11663-11670. Urban Area Criteria for Census 2000

Mallin, M.A., K.E. Williams, E.C. Escham, R.P. Lowe (2000). Effect of Human Development on Bacteriological Water Quality in Coastal Wetlands. Ecological Applications 10: 1047-1056.

USEPA (2001). Managing Pet and Wildlife Waste to Prevent Contamination of Drinking Water. **Online**: http://www.epa.gov/safewater/sourcewater/pubs/fs_swpp_petwaste.pdf.

USEPA (2011a). Managing Nonpoint Source Pollution from Agriculture. **Online:** http://water.epa.gov/polwaste/nps/outreach/point6.cfm

USEPA (2011b). Riparian Zone and Stream Restoration. **Online:** http://epa.gov/ada/eco/riparian.html

USEPA (2011c). Land Use Impacts on Water. Online: http://epa.gov/greenkit/toolwq.htm